Determining Impulse of 3-D Printed Rocket Nozzles

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The Purpose of this experiment was to determine which has more effect on the impulse of a 3-D printed rocket (DeLaval) nozzle, throat radius or exit radius. The total impulse aids in the ability to determine how high a rocket were to travel if loaded with propellant, and is determined by the specifications of the nozzle and type of propellant used. This experiment used several nozzles: each with a variance of throat radius and exit radius. The procedure involved using attaching the DeLaval nozzles to a LabQuest Student Force Probe to measure the area under the curve (impulse) of each DeLaval nozzle 20 times each when fired with compressed air at approximately 40 PSI for approximately 5 seconds. The LabQuest software recorded graphs of each nozzle firing and recorded the area under the curve, which was run through a ANOVA and a post hoc test in order to determine if data was significant from each other. It was determined that nozzles with a smaller throat radius have greater impulse, and that a larger exit radius does not affect impulse as much as throat radius.

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